



DESIGNING INNOVATIVE VACUUM
GAUGES AND CONTROLLERS FOR
OVER 30 YEARS

CASE STUDY ON PRODUCT DESIGN ASPIRATION VACUUM CONTROL: FOR MEDICAL USE

PROBLEM STATEMENT: A surgical equipment manufacturer contacted DigiVac with the problem of maintaining vacuum pressure consistently during procedures such as liposuction. Current products could not maintain consistent pressure resulting in a build-up of vacuum pressure during a blockage of the cannula, stall of vacuum, then increase of vacuum pressure after the blockage was removed. Physicians were looking for more consistent control of the vacuum pressure.

Current: Available products could not maintain consistent suction

Need: A product that delivered consistent vacuum pressure

Goal: Consistent liposuction control without build-up of vacuum pressure or stall of vacuum

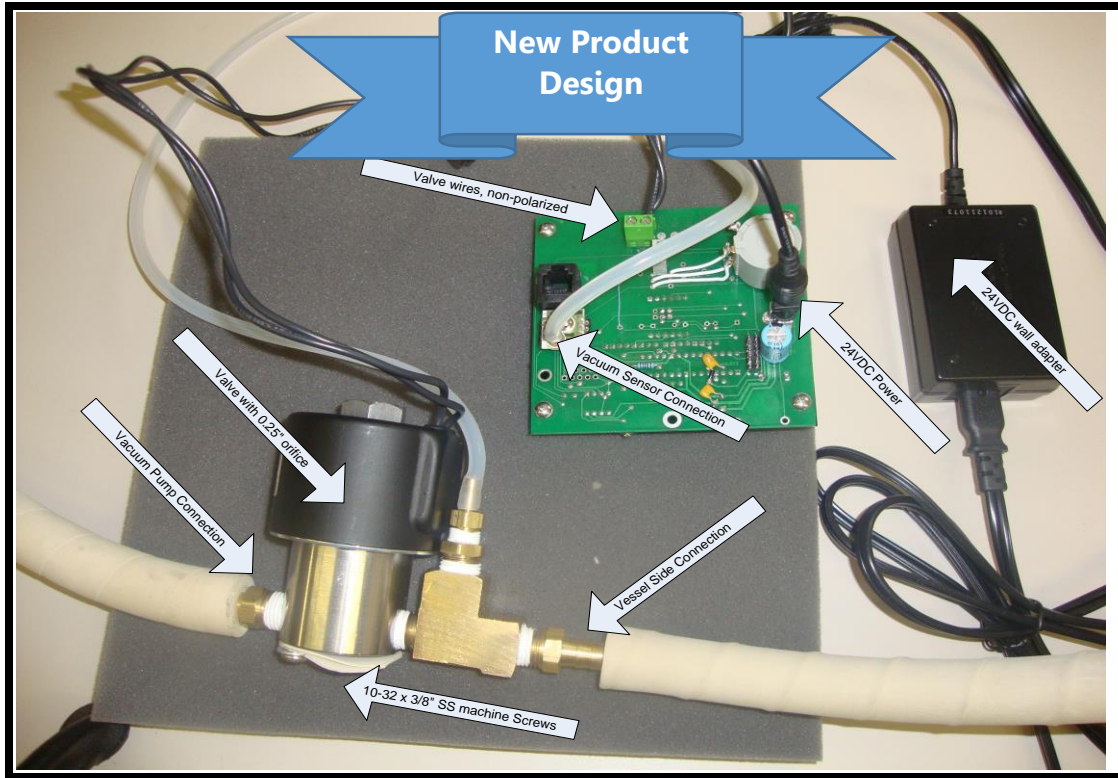
ENGINEERING APPROACH: Our team began the iterative process by collaborating with the medical manufacturer to determine exactly what their customer's needs were. We verified the required flow rate for the liposuction medical procedure and the vacuum range of interest—determined by the cannula orifice-size .062-.300 and a pump that yielded a 6.8 CFM (cubic feet per minute) of air flow through the system.

The DigiVac team determined that the desired liposuction pressure was anything from 0 to 29.9 inches of Hg (Mercury) with the performance optimized in the 15 inches of Hg range.

During the design process, the manufacturer requested an additional desired feature set that included the need to maintain vacuum pressure:

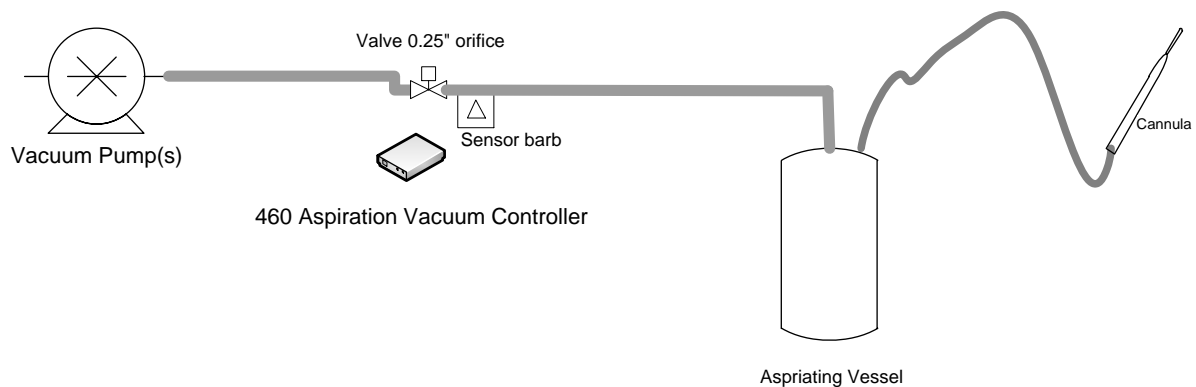
- When Suction Collection Chamber size changed (either 1, 2, or 3 liters)
- With variable chamber volume (fill capacity) up to 85%—effectively made the range of chamber volumes from 0.15 liters (15% of 1 liter volume) to 3 liters

Other variables included **a valve/orifice configuration that satisfied the economic parameters** determined by the medical device company. Several valve candidates were identified and these were tested in a simulated liposuction procedure using apple sauce (recommended by client) as the substitute for fatty tissue. *See aspiration vacuum control video.*



There were a couple of these combinations that met the primary needs of the medical device company, but only 1 configuration met the **added customer needs of being aesthetically pleasing as well as a quiet system (low DbA).**

New Product Design: Aspiration Vacuum Control for Liposuction (Medical Use)



RESULTS: The DigiVac engineering team used an iterative approach to design and develop a product that met the specific needs of the client for consistent and precise vacuum regulation during the aspiration process.

Commonly, during the design process, different combinations of components may be tested to determine if they meet the needs of the client. During this phase, we discovered additional client needs; which were incorporated into the final design.

The Aspiration Vacuum Controller for medical use is just one example of the many products that DigiVac has designed, developed and delivered to our client base.



Medical Aspiration Controller for Liposuction Procedures (Model 460)

SUMMARY

The DigiVac Aspiration Vacuum Controller for Medical Use (Model 460) enables the user to control how much force is used to aspirate tissue or fluids. [See it in action!](#)

It works on the principal of cycling a valve that is in-line with a vacuum pump in order to maintain constant and consistent pressure (vacuum) inside a collection vessel.

It uses a solid state sensor mounted on the vessel side of the valve for vacuum telemetry. The vacuum can be set at any value from 0.0 to 29.9 inches of Hg. The higher the value, the greater the vacuum that is maintained.

The **DigiVac Design Advantage** delivers a wealth of **vacuum engineering knowledge** to develop innovative products that meet your specific needs in a cost effective manner.

We relish the chance to **work collaboratively** with clients **to develop innovative products** that meet the discriminating needs of today's industries.

Contact us to see how we can meet your vacuum needs at <http://www.digivac.com/contact-us/>.